

# **California County Asthma Mortality Chart Book**

**Data for 1990-1997**



Gray Davis, Governor  
State of California

Grantland Johnson, Secretary  
Health and Human Services Agency

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Department of Health Services



**Environmental Health Investigations Branch  
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## **AUTHORS AND ACKNOWLEDGEMENTS**

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This report was prepared by Alexandra Hernandez, Julie Von Behren, and Richard Kreutzer of the Environmental Health Investigations Branch (EHIB) of the California Department of Health Services.

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## **HOW TO USE THIS REPORT**

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This report presents mortality rates for asthma in California counties for 1990 through 1997. The report is intended to provide information to counties in comparison to California rates and national rates. Rates are shown separately by race/ethnicity to help county health officials identify populations most at risk for severe asthma morbidity. Individual county data is presented in tables as well as on maps and graphs. Rates are not presented for all counties because of small numbers.

Mortality rates are not indicators of asthma prevalence. Asthma is a chronic disease which can present on a spectrum of severity. Mortality rates measure a rare, severe outcome of this disease.

For more information please contact the California Department of Health Services, Environmental Health Investigations Branch at 510-622-4500.

## I. INTRODUCTION

Asthma is a disease of the respiratory system that causes constriction of the bronchi (breathing tubes). Symptoms include shortness of breath, wheezing, tightness in the chest and coughing. Asthma is treatable with medications and avoidance of asthma triggers. Asthma attacks can rarely result in death. However, mortality rates have been increasing since the mid 1970s in California.<sup>1</sup> National asthma mortality rates have doubled in the last two decades.<sup>2</sup>

In California, approximately 2.2 million people suffer from asthma.<sup>2</sup> Only a very small fraction of these cases result in death. In 1997 only 667 deaths from asthma occurred in California. However, each of these deaths can be considered preventable. It is important to identify any particular groups in California that should be targeted for prevention strategies.

In this report we present the results of an analysis of asthma mortality rates in California for the years 1990-1997. Data from these years were combined to increase the number of cases available for analysis. We have included information on statewide mortality rates stratified by race/ethnicity, gender, and age. We also show mortality rates by county.

## II. METHODS

The data for deaths that occurred in 1990-1997 were obtained from the California Death Public Use Tape<sup>3</sup> from the Department of Health Services. The database contains demographic data on each death including age, race/ethnicity, county of residence and date of death. The ninth revision of the International Classification of Disease (ICD-9) coding system was used to assign a specific cause of death from the original death certificate field "underlying cause of death". Deaths that were coded with the ICD code 493, asthma<sup>4</sup>, were selected for analysis.

Mortality rates were calculated for California using eight years of data, 1990-1997. Data were combined to produce more stable estimates. Rates were calculated using yearly population estimates by age, race/ethnicity group, sex, and county.<sup>5</sup> Four race/ethnicity groups were used: Non-Hispanic White, Black, Hispanic, and Asian/Pacific Islander. Individuals with a race/ethnicity of 'other' or 'unknown' were excluded from race-specific analyses but included in the overall estimates. Rates were adjusted using the direct method to the 1970 U.S. 1 million population so that the rate could be compared to national figures. Eighteen age groups were used: 0-4 years, 5-84 in five year age groups, and over 84 years. The 95% confidence intervals (CI) were calculated for the age-adjusted rates using a square root transformation assuming a Poisson distribution.<sup>6</sup> Rates based on small numbers are very imprecise; therefore any rate based on fewer than 20 deaths is omitted from tables and figures.

The years of potential life lost (YPLL) index enumerates the total years lost due to decedents who did not reach a particular age cut off. YPLLs were calculated for California using the cutoff age of 75. The age at death of each individual was subtracted from 75 and the sum of those numbers is the YPLL for the eight-year period. Individuals over the age of 75 were not included in the calculation.

### III. RESULTS

In the time period from 1990 to 1997, 4,978 deaths due to asthma occurred in California. The overall age-adjusted mortality rate was 18.8 deaths per 1 million population (95% CI 18.2-19.4). The rate was 17.2/million for Non-Hispanic Whites. The rate for Blacks was substantially higher at 43.0/million. The rates for Hispanics and Asian/Pacific Islanders were 11.0 and 25.5 respectively. Rates were higher in females 24.0 than in males 18.9 and were highest in the oldest age group (65 years and older) at 90.8 per million. Tables 1 through 3 present these results in more detail.

The average age at death from asthma in California for the eight-year period of 1990-1997 was 62.3 years. The years of potential life lost over that same period was 75,796 years. Table 4 contains the YPLL and average age at deaths by year for California.

Table 5 presents overall age adjusted asthma mortality rates and some race/ethnicity specific mortality rates, where possible, for the 58 California counties. Figures 1 through 5 present the same information graphically ranked from lowest to highest rate with 95% confidence bars, with the state rate presented for comparison. A few counties had rates that were significantly higher than the state rate (San Bernardino, Alameda, San Joaquin and Sacramento) and a few had significantly lower rates than California (San Luis Obispo, Santa Clara, Orange, Ventura, and Los Angeles). Map 1 shows each county shaded according to the overall asthma mortality rate.

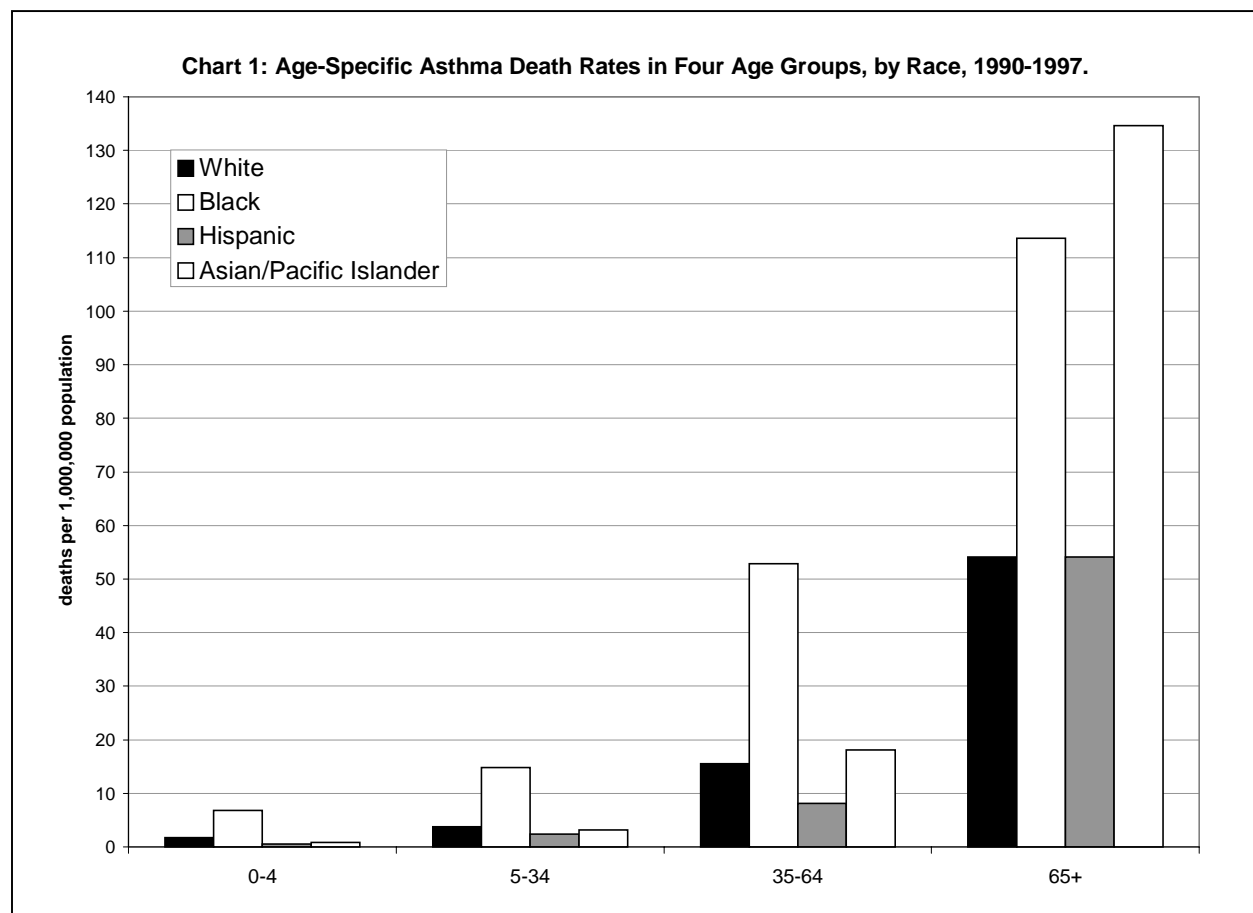


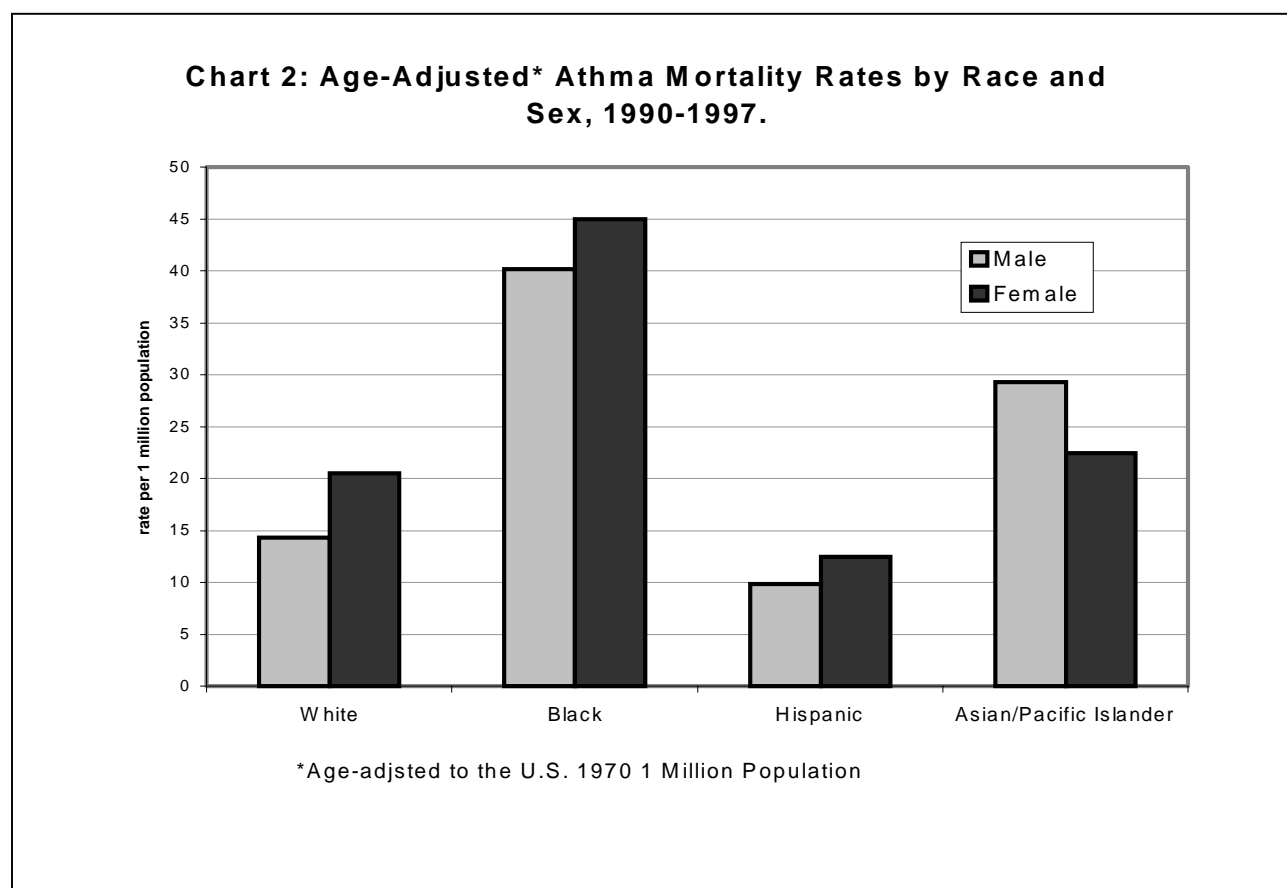
Table 6 gives the number of deaths that occurred in each county by race/ethnicity group. For reasons of confidentiality, if fewer than five deaths occurred in a particular group the exact number is not presented.

#### IV. DISCUSSION

The asthma mortality among Blacks was over two times higher than among non-Hispanic whites in California. Asians and Pacific Islanders also had significantly elevated rates compared to non-Hispanic whites. The mortality rate for Hispanics was lower than all the other race/ethnicity groups. Asians had lower mortality for asthma than Blacks in all the age groups except among those 65 years and older (Chart 1). Females had higher asthma death rates than males in all race/ethnicity groups except among Asians/Pacific Islanders (Chart 2).

While publicity often focuses on asthma deaths that occur in children, the death rate in children aged 0-14 years was very low in all race/ethnicity groups. Asthma mortality rates increased greatly with age. The average age at death from asthma in all years studied was over 60 years. However, even with the small numbers of observed deaths in children, the rates among Black children was still significantly higher than the rates for other children.

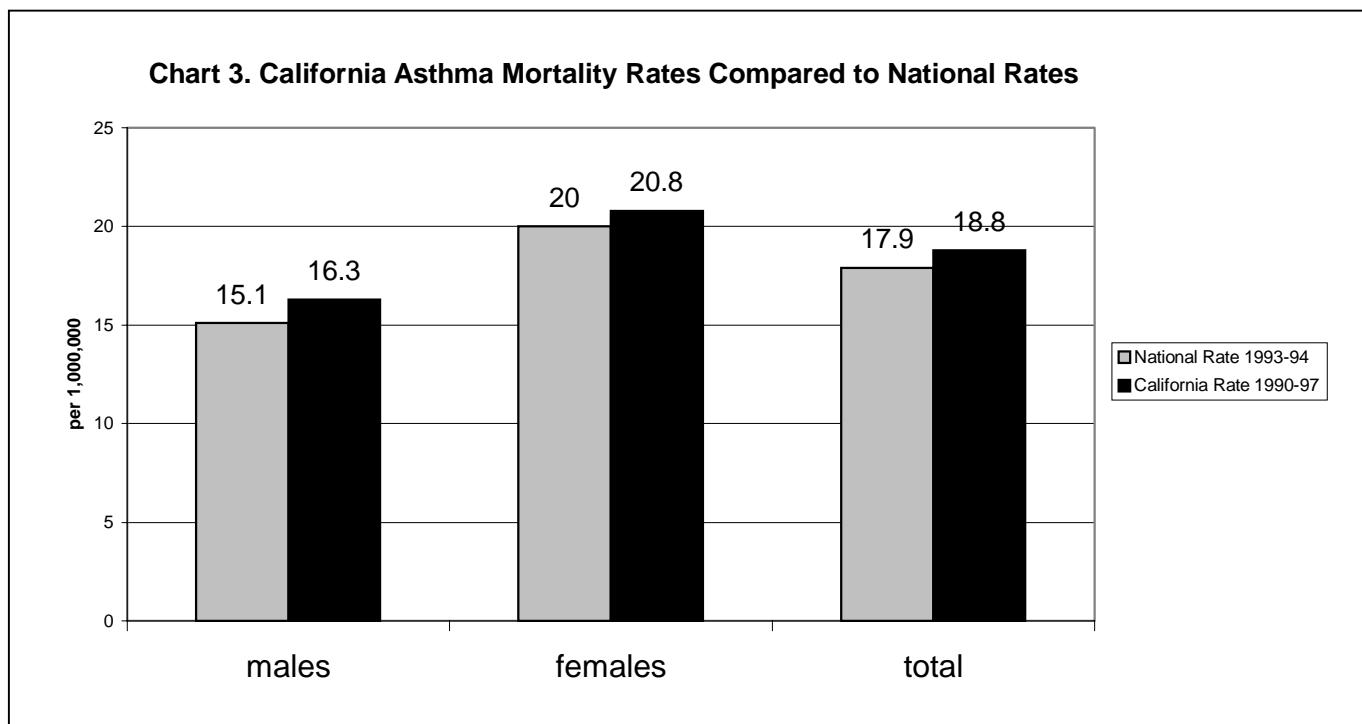
California's asthma mortality rates were slightly higher than the recently reported national rates (Chart 3).<sup>2</sup> Rates were higher among females than males both in California and nationally. No national information was available for Hispanics or Asian/Pacific Islanders to compare to. The confidence intervals for the county-specific rates are very wide and most are not significantly



different from each other or the state rate. Confidence intervals are indicators of the precision of the rates. A very wide interval indicates a small number of subjects in a calculation and a highly variable estimate. Though we did not present any rates based on fewer than 20 cases, some estimates still remain fairly unstable. The point estimates produced for individual counties should be used cautiously.

Limitations of this analysis include potential incorrect coding of cause of death on the death certificate. Accuracy of cause of death information decreases with age of the decedent.<sup>7</sup> The underlying cause of death is considered most reliable for people between 5 and 35 years of age. Also, misclassification of the race and ethnicity of the decedents occurs.

Death certificates provide one of the few sources of statewide data available for asthma surveillance. This data is often considered to be the least useful because it measures an extremely rare event and does not reflect the true burden of disease in the population. However, this data can highlight groups that must be targeted for aggressive prevention strategies. For asthma, these groups are Blacks of all ages and elderly Asians and Pacific Islanders.



Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

## **V. REFERENCES**

1. Schenker MB, Gold EB, Lopez RL, Beaumont JJ. Asthma mortality in California, 1960-1989. Demographic patterns and occupational associations. *American Review of Respiratory Disease* 147:1454-60 (1993).
2. Mannino DM, Homa DM, Pertowski CA, Ashizawa A, Nixon LL, Johnson CA, Ball LB, Jack E, Kang DS. Surveillance for asthma--United States, 1960-1995. *Morbidity and Mortality Weekly Report. CDC Surveillance Summaries* 47:1-27 (1998).
3. Public Use Death Tape. Sacramento: California Department of Health Services. Vital Statistics Section, 1989-1997.
4. The International Classification of Diseases, Ninth Revision, Clinical Modification, ICD-9-CM: U.S. Department of Health and Human Services, 1989.
5. Race/Ethnic Population Estimates with Age and Sex Detail. Sacramento, CA: State of California. Department of Finance, 1970-1996. <http://www.dof.ca.gov/>.
6. Fleiss J. *Statistical Methods for Rates and Proportions*. New York: John Wiley and Sons, 1981.
7. Sears MR, Rea HH, de Boer G, Beaglehole R, Gillies AJ, Holst PE, O'Donnell TV, Rothwell RP. Accuracy of certification of deaths due to asthma: a national study. *American Journal of Epidemiology* 124:1004-11(1986).





**Table 1: Age-Adjusted\* California Asthma Mortality Rates\*\* by Race/Ethnicity, 1990-1997.**

	All Ages			Children (0-14)		
	Number of Deaths	Rate (Deaths/1,000,000)	95% CI	Number of Deaths	Rate (Deaths/1,000,000)	95% CI
Total	4978	18.8	(18.2-19.4)	144	0.7	(0.7-0.8)
Non-Hispanic White	3265	17.2	(16.9-18.4)	48	0.5	(0.5-0.6)
Black	473	43.0	(39.9-46.2)	28	3.4	(3.0-4.0)
Hispanic	544	11.0	(10.3-12.1)	14	0.4	(0.3-0.5)
Asian/Pacific Islander	676	25.5	(23.5-27.6)	54	0.7	(0.3-0.9)

**Table 2: Age-Adjusted\* California Asthma Mortality Rates\*\* by Race/Ethnicity and Sex, 1990-1997.**

Race	Male			Female		
	Number of Deaths	Rate (Deaths/1,000,000)	95% CI	Number of Deaths	Rate (Deaths/1,000,000)	95% CI
Total	1923	16.3	(15.6-17.1)	3055	20.8	(20.0-21.7)
White	1132	14.3	(13.4-15.3)	2133	20.5	(19.3-21.6)
Black	300	40.2	(35.9-44.7)	376	45.0	(40.5-49.6)
Hispanic	196	9.8	(8.7-11.0)	277	12.4	(11.1-13.7)
Asian/Pacific Islander	283	29.3	(26.4-32.3)	261	22.4	(19.8-25.1)

**Table 3: California Asthma Mortality Rates\*\* in Four Age Groups by Race/Ethnicity, 1990-1997.**

Age Group	0-4		5-35		36-64		65+	
	Number of Deaths	Rate (Deaths/1,000,000)	Number of Deaths	Rate (Deaths/1,000,000)	Number of Deaths	Rate (Deaths/1,000,000)	Number of Deaths	Rate (Deaths/1,000,000)
Total	37	1.5	544	4.1	1639	16.6	2758	90.8
White	17	1.7	239	3.8	936	15.5	2073	54.1
Black	13	6.8	150	14.8	343	52.9	170	113.6
Hispanic	5	0.5	107	2.4	166	8.1	195	54.1
Asian/Pacific Islander	2	0.8	45	3.2	185	18.1	312	134.6

**Table 4: Average Age at Death, Years of Potential Life Lost (YPLL) for Asthma Deaths by Year, 1990-1997.**

Year	YPLL	Average Age	Year	YPLL	Average Age
Total (1990-1997)	75,796	62.3	1994	10,474	62.2
1990	8,378	62.3	1995	10,265	61.8
1991	8,823	62.6	1996	9,547	63.4
1992	8,708	62.2	1997	9,592	62.3
1993	10,009	60.3			

\* Age-adjusted to the 1970 U.S. One Million Population.

\*\* Rate per 1,000,000 population.

Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

Appendix 1

**Table 5: Age-adjusted\* Asthma Mortality Rates\*\* in California by County and Race/Ethnicity for All Ages, 1990-1997.**

County	Total		Non-Hispanic White			Black		Hispanic		Asian/ Pacific Islander	
	Rate	95% CI	Rate	95%	CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
<b>California</b>	<b>18.8</b>	<b>18.2 -19.4</b>	<b>17.7</b>	<b>16.9</b>	<b>-18.4</b>	<b>43.0</b>	<b>39.9 -46.2</b>	<b>11.0</b>	<b>10.3 -12.1</b>	<b>25.5</b>	<b>23.5 -27.6</b>
Alameda	23.4	20.4 -26.5	15.5	12.0	-19.3	56.6	46.0 -68.3	.	.	29.2	21.5 -38.1
Alpine	.	.	.	.	.	.	.	.	.	.	.
Amador	.	.	.	.	.	.	.	.	.	.	.
Butte	31.3	22.7 -41.3	.	.	.	.	.	.	.	.	.
Calaveras	.	.	.	.	.	.	.	.	.	.	.
Colusa	.	.	.	.	.	.	.	.	.	.	.
Contra Costa	17.1	14.0 -20.5	15.5	11.9	-19.6	38.0	23.9 -55.3	.	.	.	.
Del Norte	.	.	.	.	.	.	.	.	.	.	.
El Dorado	18.0	10.7 -27.1	.	.	.	.	.	.	.	.	.
Fresno	18.5	15.1 -22.2	16.3	11.7	-21.6	.	.	16.0	10.8 -22.4	.	.
Glenn	.	.	.	.	.	.	.	.	.	.	.
Humboldt	27.4	17.8 -39.2	27.5	17.1	-40.3	.	.	.	.	.	.
Imperial	.	.	.	.	.	.	.	.	.	.	.
Inyo	.	.	.	.	.	.	.	.	.	.	.
Kern	19.9	16.0 -24.2	20.0	15.0	-25.6	.	.	.	.	.	.
Kings	24.9	15.3 -36.9	.	.	.	.	.	.	.	.	.
Lake	32.2	16.5 -53.1	33.9	16.5	-57.4	.	.	.	.	.	.
Lassen	.	.	.	.	.	.	.	.	.	.	.
Los Angeles	17.6	16.6 -18.6	16.5	14.8	-18.2	40.6	36.1 -45.4	11.0	9.3 -11.8	18.2	15.3 -21.3
Madera	.	.	.	.	.	.	.	.	.	.	.
Marin	16.9	11.1 -24.0	18.2	11.5	-26.5	.	.	.	.	.	.
Mariposa	.	.	.	.	.	.	.	.	.	.	.
Mendocino	20.9	11.1 -33.8	.	.	.	.	.	.	.	.	.
Merced	26.0	18.4 -34.8	27.2	16.7	-40.2	.	.	.	.	.	.
Modoc	.	.	.	.	.	.	.	.	.	.	.
Mono	.	.	.	.	.	.	.	.	.	.	.
Monterey	19.5	14.6 -25.1	15.8	9.7	-23.5	.	.	.	.	.	.
Napa	16.7	9.1 -26.6	17.1	8.4	-28.9	.	.	.	.	.	.
Nevada	.	.	.	.	.	.	.	.	.	.	.
Orange	14.2	12.5 -15.9	13.8	11.7	-16.1	.	.	7.0	4.9 -10.3	22.2	16.2 -29.1
Placer	23.8	16.5 -32.4	26.1	17.9	-35.8	.	.	.	.	.	.
Plumas	.	.	.	.	.	.	.	.	.	.	.
Riverside	17.1	14.7 -19.8	15.9	12.8	-19.3	58.4	39.4 -81.1	.	.	.	.
Sacramento	26.6	23.2 -30.3	23.7	19.7	-28.0	72.4	54.5 -92.9	.	.	37.8	25.7 -52.1
San Benito	.	.	.	.	.	.	.	.	.	.	.
San Bernardino	22.5	19.8 -25.3	22.3	18.8	-26.0	43.1	30.2 -58.3	20.0	15.0 -25.3	.	.
San Diego	17.5	15.7 -19.4	16.9	14.6	-19.3	41.1	29.8 -54.2	9.0	6.3 -12.4	34.4	25.8 -44.3
San Francisco	24.6	20.3 -29.3	16.9	10.8	-24.5	43.5	28.0 -62.3	.	.	34.3	25.9 -43.8
San Joaquin	25.9	21.1 -31.2	21.1	15.3	-27.7	.	.	.	.	49.4	31.7 -70.9
San Luis Obispo	12.2	7.4 -18.2	13.0	7.5	-20.0	.	.	.	.	.	.
San Mateo	19.6	15.8 -23.8	17.1	12.3	-22.8	.	.	.	.	28.1	18.2 -40.2
Santa Barbara	18.6	13.9 -24.0	18.3	12.4	-25.3	.	.	.	.	.	.
Santa Clara	13.5	11.5 -15.8	13.3	10.5	-16.4	.	.	.	.	21.3	15.6 -27.9
Santa Cruz	23.5	16.8 -31.3	25.5	17.2	-35.3	.	.	.	.	.	.
Shasta	21.9	14.3 -31.1	20.9	13.1	-30.5	.	.	.	.	.	.
Sierra	.	.	.	.	.	.	.	.	.	.	.

Appendix 1

**Table 5: Age-adjusted\* Asthma Mortality Rates\*\* in California by County and Race/Ethnicity for All Ages, 1990-1997 (continued).**

County	Total		Non-Hispanic White			Black		Hispanic		Asian/ Pacific Islander	
	Rate	95% CI	Rate	95%	CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Siskiyou	.	.	.	.	.	.	.	.	.	.	.
Solano	20.2	15.2 -25.9	18.9	12.7	-26.3	.	.	.	.	.	.
Sonoma	20.6	15.8 -26.1	20.9	15.5	-27.1	.	.	.	.	.	.
Stanislaus	17.9	13.5 -22.9	18.4	13.0	-24.8	.	.	.	.	.	.
Sutter	.	.	.	.	.	.	.	.	.	.	.
Tehama	27.8	13.8 -46.8	.	.	.	.	.	.	.	.	.
Trinity	.	.	.	.	.	.	.	.	.	.	.
Tulare	20.1	15.1 -25.9	22.9	15.5	-31.9	.	.	.	.	.	.
Tuolumne	.	.	.	.	.	.	.	.	.	.	.
Ventura	16.2	13.0 -19.8	17.0	12.8	-21.8	.	.	.	.	.	.
Yolo	27.7	18.7 -38.4	30.1	18.8	-44.1	.	.	.	.	.	.
Yuba	.	.	.	.	.	.	.	.	.	.	.

\* Age-adjusted to the 1970 U.S. One Million Population.

\*\* Rate per 1,000,000 population.

. = Rate not calculated because of small numbers.

Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

# Appendix 1

**Table 6: Number of Asthma Deaths by County and Race/Ethnicity for All Ages, 1990-1997.**

	Total	Non-Hispanic White	Hispanic	Asian	Black
<b>CALIFORNIA</b>	<b>4978</b>	<b>3265</b>	<b>473</b>	<b>544</b>	<b>676</b>
Alameda	262	105	14	44	99
Alpine	0				
Amador	7	6	†	†	†
Butte	83	80	†	†	†
Calaveras	5	†	†	†	†
Colusa	†	†	†	†	†
Contra Costa	131	94	5	12	20
Del Norte	8	8			
El Dorado	22	18	†	†	†
Fresno	110	65	23	11	10
Glenn	6	6			
Humboldt	31	28	†	†	†
Imperial	16	7	5	†	†
Inyo	5	5			
Kern	93	70	10	†	9
Kings	20	11	†	†	†
Lake	23	22	†	†	†
Lassen	†	†	†	†	†
Los Angeles	1284	655	192	133	299
Madera	19	17	†	†	†
Marin	37	35	†	†	†
Mariposa	†	†	†	†	†
Mendocino	20	19	†	†	†
Merced	38	27	†	†	†
Modoc	†	†	†	†	†
Mono	†	†	†	†	†
Monterey	58	35	7	12	†
Napa	24	22	†	†	†
Nevada	19	17	†	†	†
Orange	287	216	24	39	7
Placer	46	46			
Plumas	†	†	†	†	†
Riverside	203	147	19	9	26
Sacramento	248	168	8	28	44
San Benito	†	†	†	†	†
San Bernardino	255	177	41	5	31
San Diego	384	285	25	42	32
San Francisco	197	72	13	83	29
San Joaquin	110	63	8	22	16
San Luis Obispo	31	30	†	†	†
San Mateo	128	86	10	21	9
Santa Barbara	70	55	6	†	†
Santa Clara	166	112	13	35	6
Santa Cruz	50	47	†	†	†
Shasta	35	32	†	†	†
Sierra	0				
Siskiyou	6	6			
Solano	52	32	†	7	10
Sonoma	82	77	†	†	†

## Appendix 1

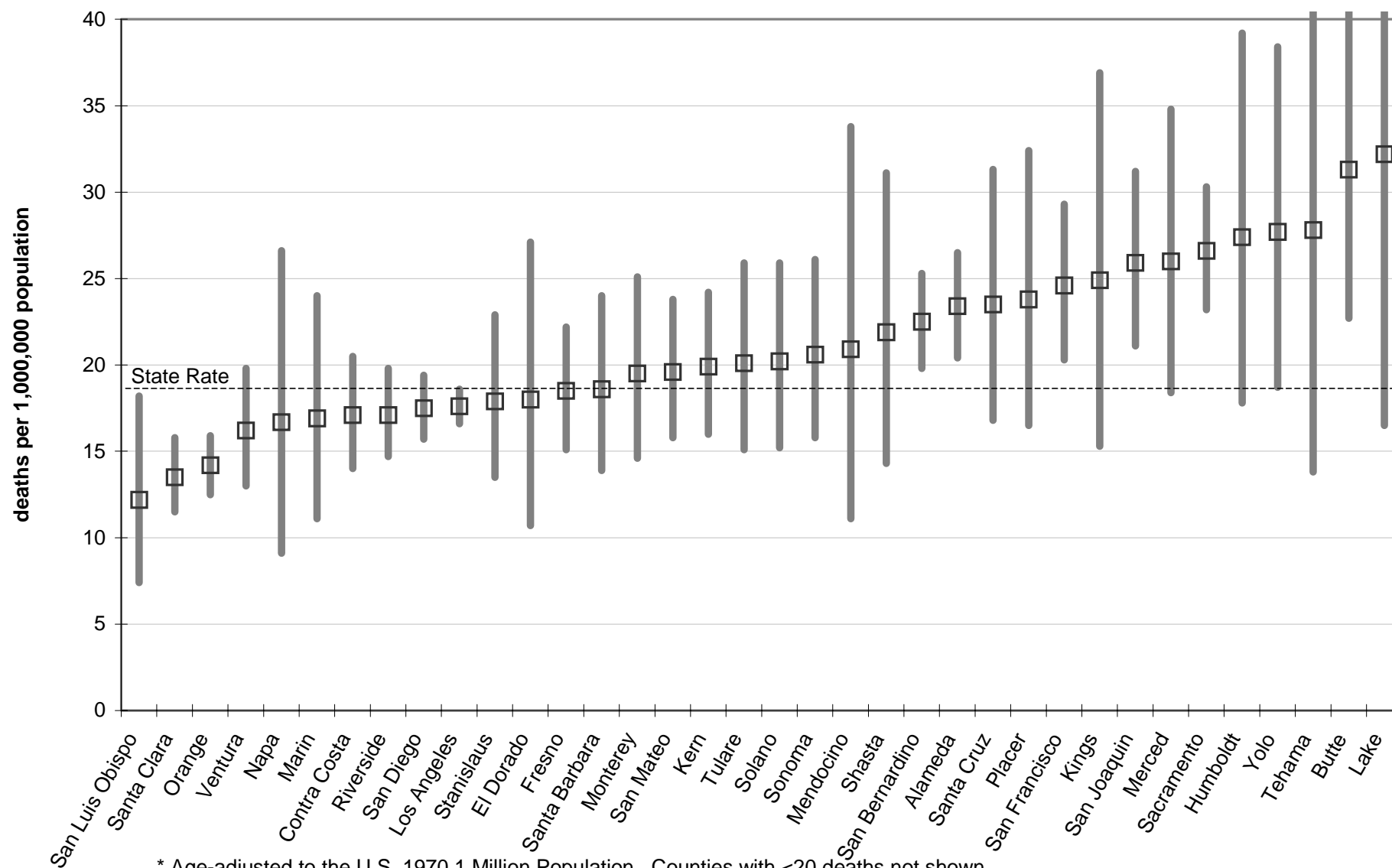
**Table 6: Number of Asthma Deaths by County and Race/Ethnicity for All Ages, 1990-1997 (continued).**

	<b>Total</b>	<b>Non-Hispanic White</b>	<b>Hispanic</b>	<b>Asian</b>	<b>Black</b>
Stanislaus	61	50	†	†	6
Sutter	5	5			
Tehama	21	19	†	†	†
Trinity	†	†	†	†	†
Tulare	58	47	10	†	†
Tuolumne	13	12	†	†	†
Ventura	92	77	8	†	†
Yolo	33	26	5	†	†
Yuba	9	9			

† < 5 cases, exact number not shown.

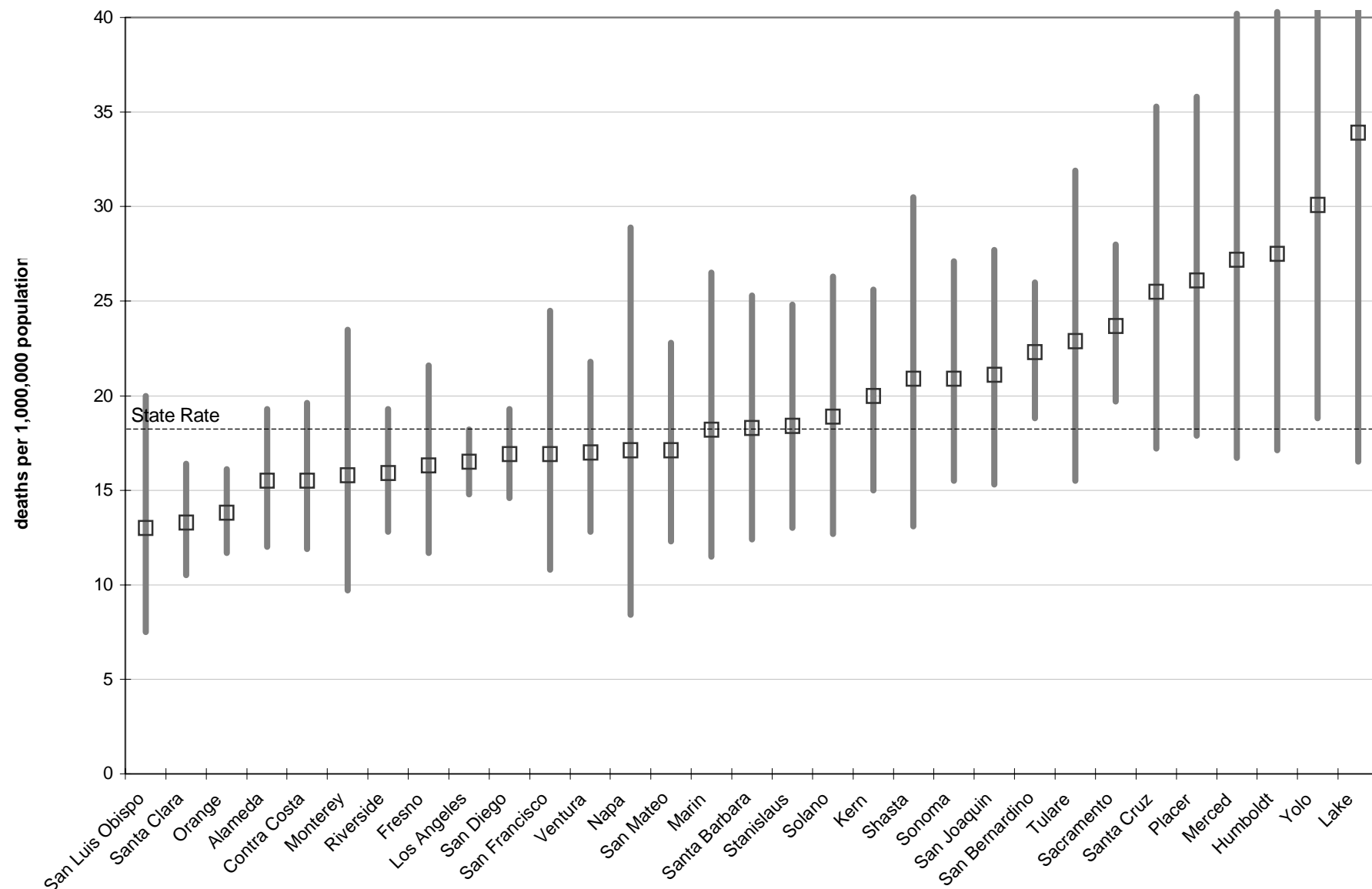
Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

**Figure 1: Age-Adjusted\* Asthma Mortality Rates with 95% Confidence Bars, All Ages and All Race/Ethnicity Groups Combined by County, 1990-1997**



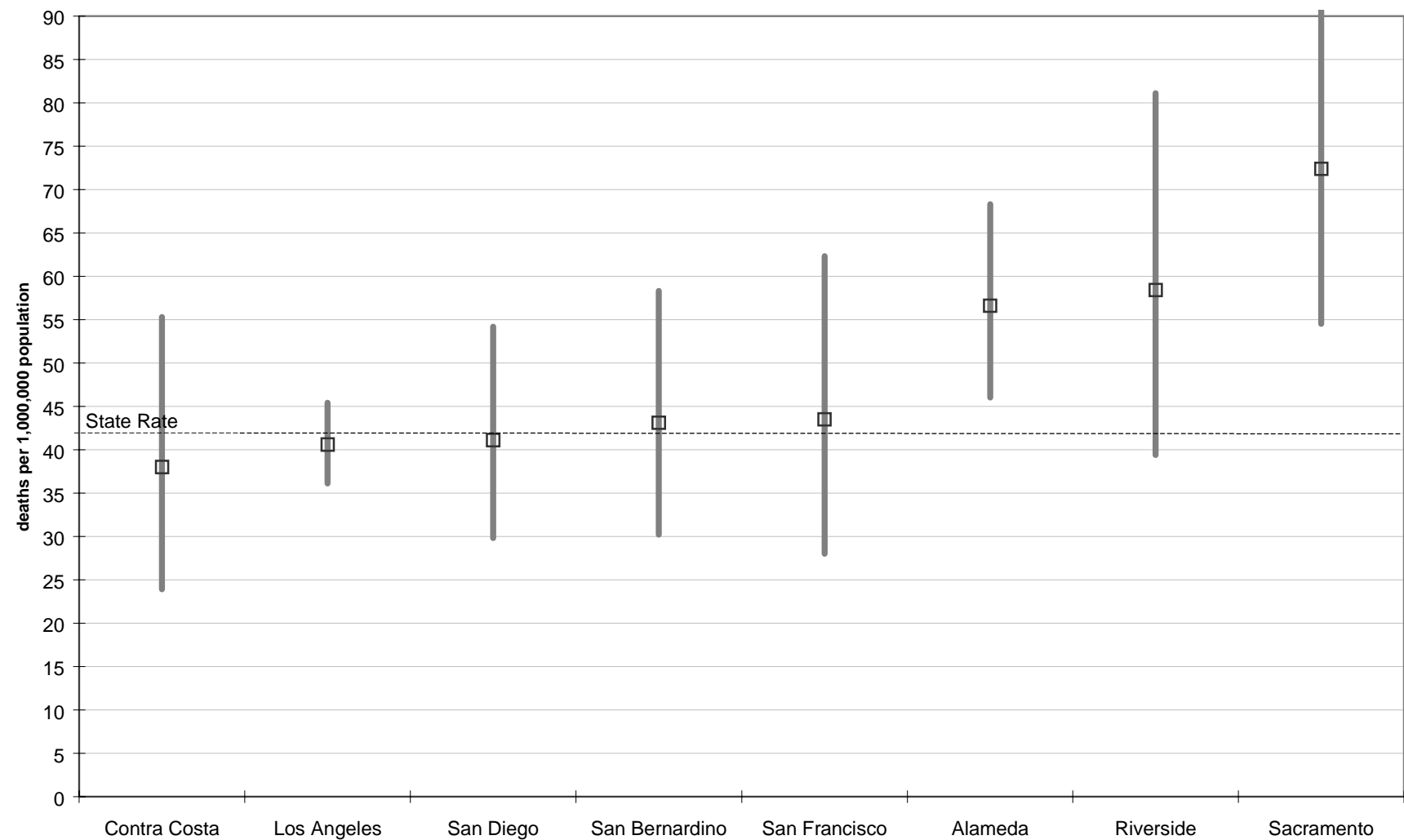
\* Age-adjusted to the U.S. 1970 1 Million Population. Counties with <20 deaths not shown.

**Figure 2: Age-Adjusted\* Asthma Mortality Rates with 95% Confidence Bars, All Ages for Non-Hispanic Whites by County, 1990-1997**





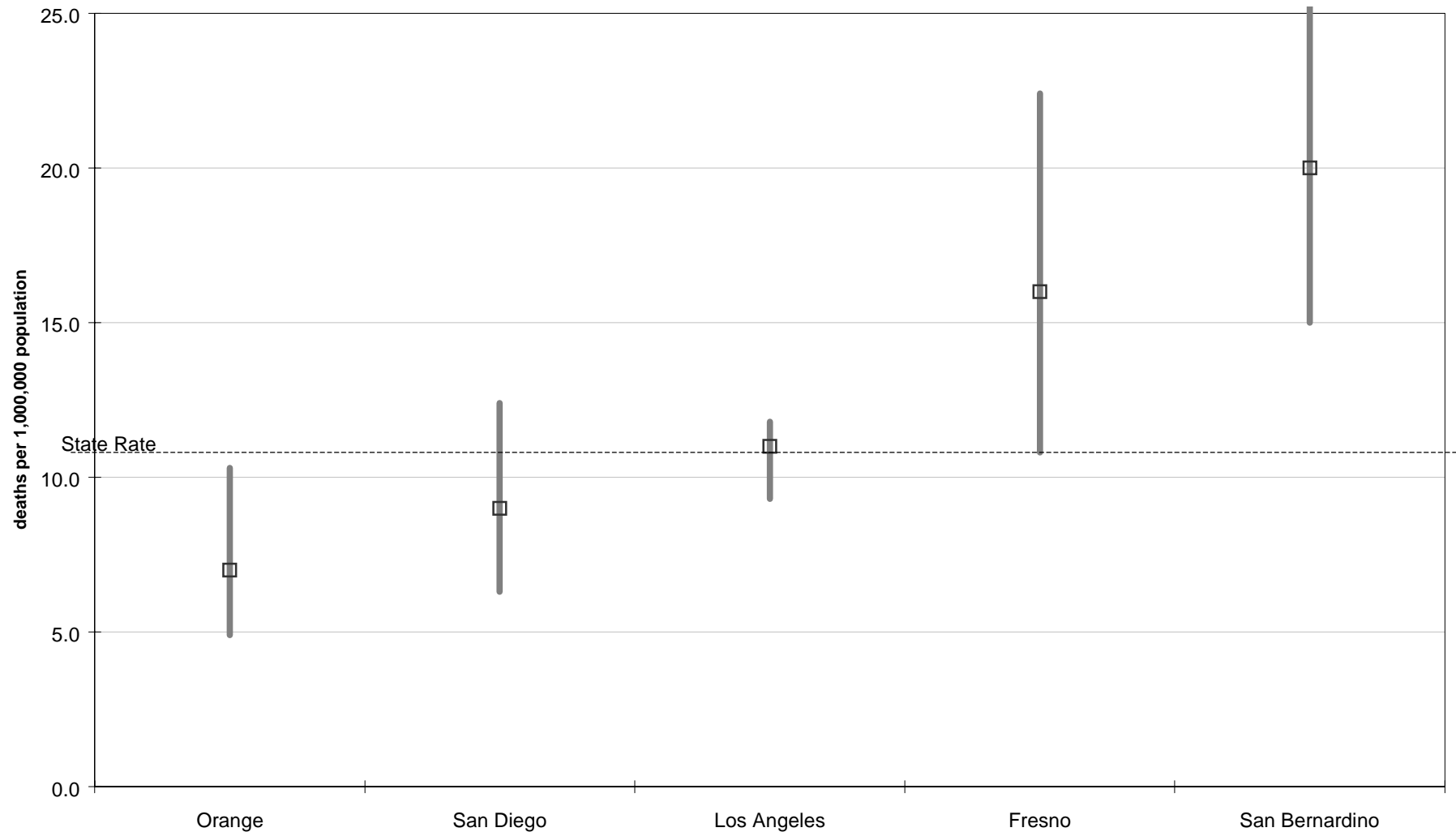
**Figure 3: Age-Adjusted Asthma Mortality Rates with 95% Confidence Bars, All Ages for Blacks by County, 1990-1997**



\* Age-adjusted to the U.S. 1 Million Population. Counties with <20 deaths not shown.

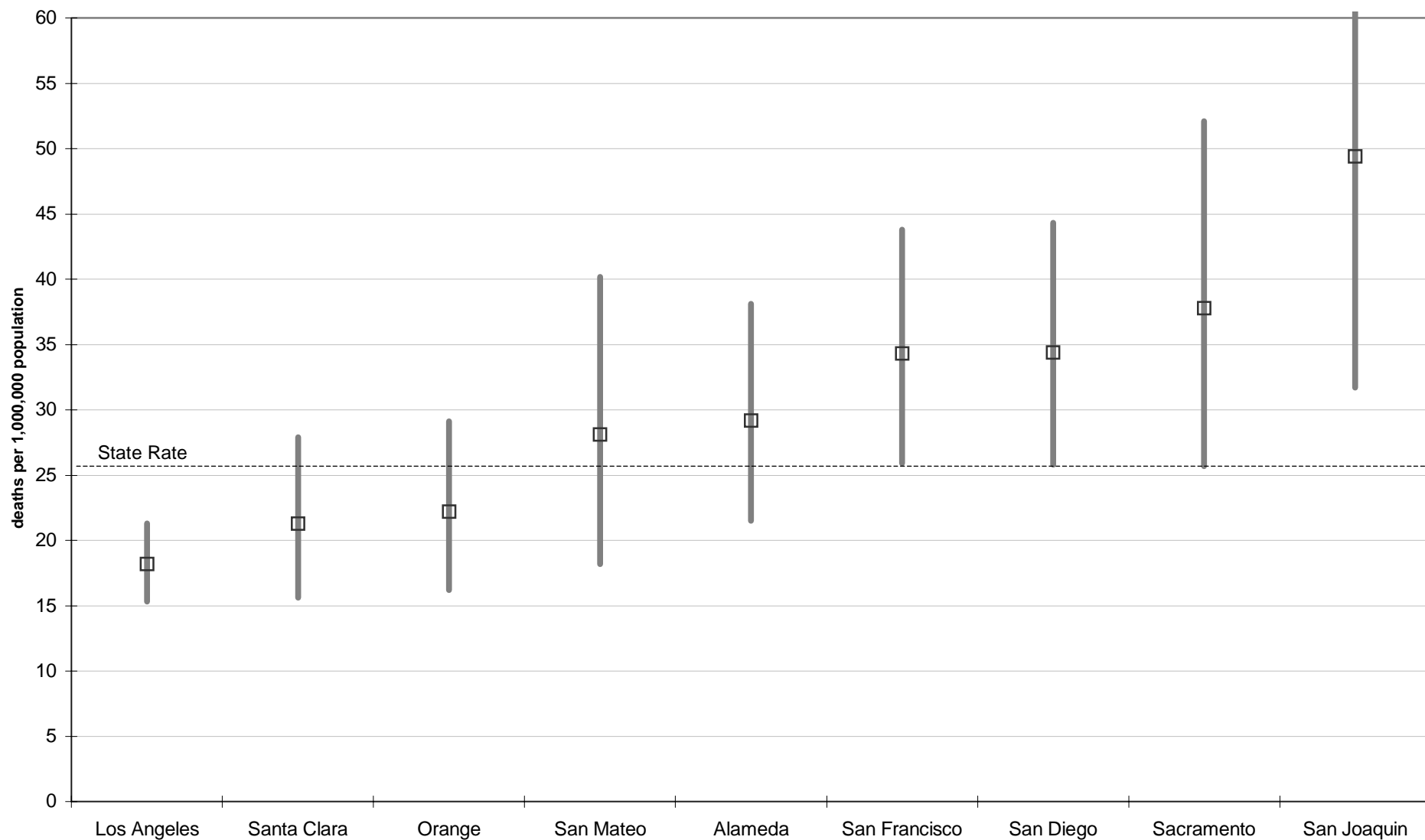
Soucre: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

**Figure 4: Age-Adjusted\* Asthma Mortality Rates with 95% Confidence Bars, All Ages for Hispanics by County, 1990-1997**



\* Age-adjusted to the U.S. 1 Million Population. Counties with <20 deaths not shown.

**Figure 5: Age-Adjusted\* Asthma Mortality Rates with 95% Confidence Bars, All Ages for Asian/Pacific Islanders by County, 1990-1997.**

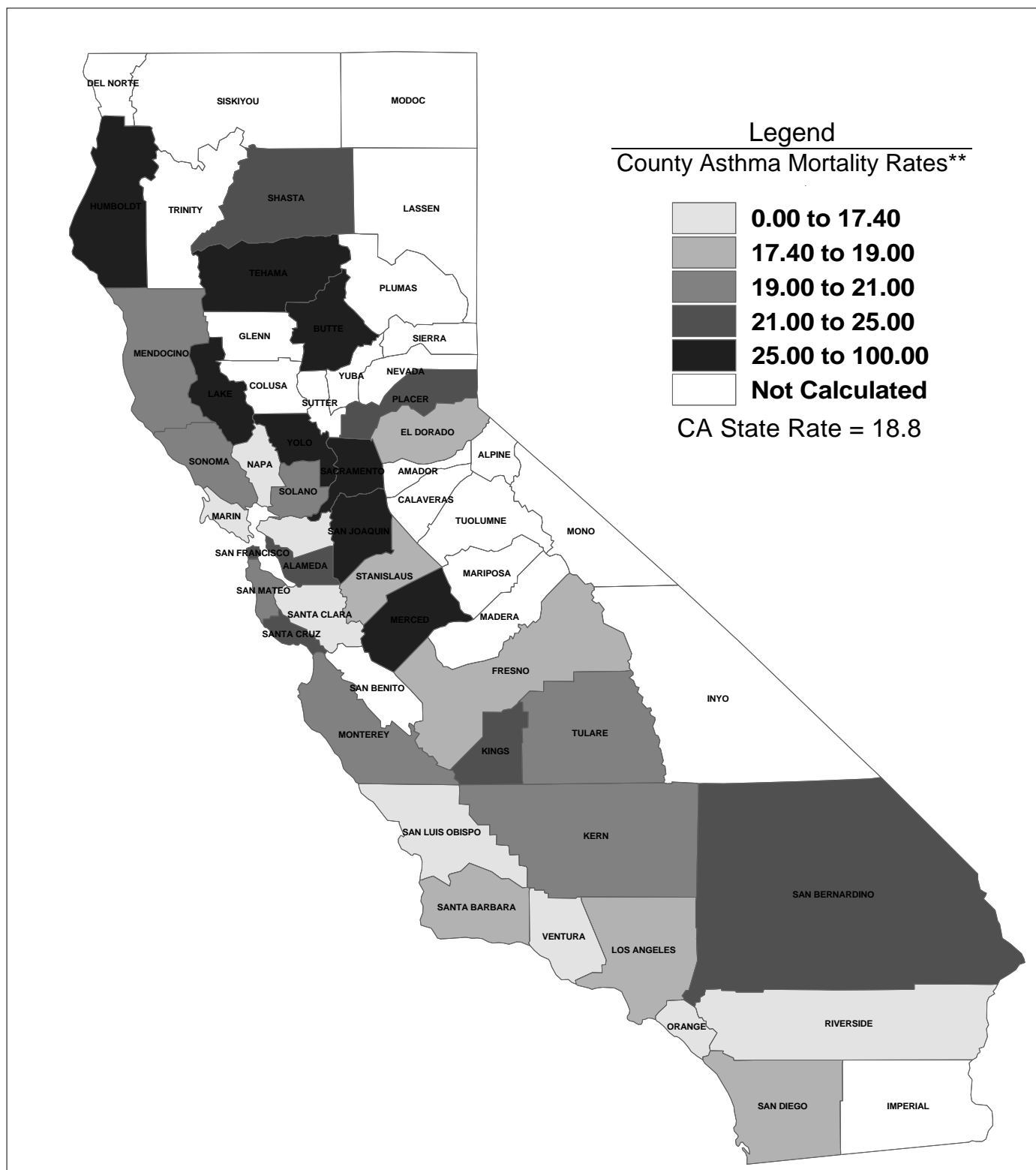


\* Age-adjusted to the U.S. 1 Million Population. Counties with <20 deaths not shown.

Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.

# Map 1: Age-Adjusted\* Asthma Mortality Rates\*\* , 1990-1997.

All Ages and All Race/Ethnicity Groups Combined.



\*Age-Adjusted to the 1970 US 1Million Population

\*\* per one million population

Source: Public Use Death Tape. California Department of Health Services. Vital Statistics Section.